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| FAY SHARPE LLP 1100 SUPERIOR AVENUE, SEVENTH FLOOR CLEVELAND, OH 44114 | | | EXAMINER ROY, SIKHA | |
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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary

Application No.

10/732,885

Applicant(s)

CHOWDHURY ET AL.

Examiner

Sikha Roy

Art Unit

2879

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 08 May 2007.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-25, 28 and 29 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-8, 11-13, 16-19, 22-25, 28 and 29 is/are rejected.
- 7) ☒ Claim(s) 9, 10, 14, 15, 20 and 21 is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. _____.
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO/SB/08)
Paper No(s)/Mail Date _____
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date _____
- 5) ☐ Notice of Informal Patent Application
- 6) ☐ Other: _____

DETAILED ACTION

The Amendment, filed on May 8, 2007 has been entered and acknowledged by the Examiner.

In light of amendments, the 112 second paragraph rejection has been withdrawn.

Cancellation of claims 26 and 27 and addition of new claims 28 and 29 have been entered.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Claims 1, 2,6,7 and 28, 29 are rejected under 35 U.S.C. 102(b) as being anticipated by U.S. Patent 5,552,671 to Parham et al.

Regarding claims 1 and 2 Parham discloses (column 3 lines 42-62, column 4 lines 37-45) a method of improving the efficacy of a quartz metal halide lamp comprises operating the lamp causing UV emission from an arc, and disposing a multi-layer coating on the surface of the arc tube the coating comprising layers of at least two materials of different refractive index which in combination reflect UV radiation in the 300-400 nm range which causes further vaporization of liquid metal halide dose within the arc tube. The coating comprising silica in combination with tantalum or titania reflects

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UV radiation and transmits visible radiation (column 2 lines 55-57, see Fig. 4). The multi-layer coating contributes to the reflective quality and varying the combination of materials, preferred UV reflecting configuration can be chosen. Furthermore in Fig. 5B Parham discloses the coating being optimized to reflect at least 95% (98% for claim 2) of the UV radiation striking the coating.

Claims 28 and 29 essentially recite the same limitations of claims 1 and 2 for a metal halide lamp and hence have been rejected for the same reason.

Regarding claim 6 Parham discloses (column 5 lines 9-16) the method for improving the efficacy of a metal halide lamp comprises disposing a multi-layer coating on the surface of an arc tube the coating comprising layers of at least two materials of different refractive index which in combination reflect UV radiation and operating the lamp to cause UV emission from the arc and reflecting UV radiation back into the lamp. Parham discloses the multilayer coating reflecting a portion of light in the visible region having wavelength 400nm back into the lamp. Furthermore Parham discloses in Fig. 5B the coating optimized to reflect at least 95% of UV and reflecting a portion of light in the visible region (wavelength 400 nm) back into the lamp.

Regarding claim 7 Parham discloses the multilayer coating reflecting a portion of light in the visible region having wavelength 400nm back into the lamp.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 3 and 4 are rejected under 35 U.S.C. 103(a) as being unpatentable over U.S. Patent 5,552,671 to Parham et al. and further in view of U.S. Patent 5,059,865 to Bergman.

Regarding claim 3 Parham discloses the arc tube formed of undoped quartz including a metal halide pool but does not explicitly disclose the limitation of at least 45% of the UV emitted by the arc tube reflected by the coating reaches the metal halide pool.

Bergman in same field of endeavor discloses (column 4 lines 13-24) a metal halide lamp in a vertical orientation in which infrared reflective coating has the benefit of increasing the vaporization and ionization of the mercury inside the lamp and thus enhancing the efficacy of the lamp.

In the instant application UV radiation, is used for heating the metal halide pool in the lamp. Therefore it would be obvious to one of ordinary skill in the art at the time of invention to select the ultraviolet reflecting coating of Parham such that most of the ultraviolet radiation emitted between 300-400 nm reaches the mercury pool for

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vaporizing and ionizing the mercury for an arc tube in vertical orientation as suggested by Bergman (in case of infrared radiation) and thus enhancing the efficacy of the lamp.

It is noted that the more UV radiation reflected by the coating reaches the metal halide pool, more vaporization of the metal halide takes place and thus the lamp performance is enhanced. It has been held that discovering an optimum value of a result effective variable involves only routine skill in the art. *In re Boesch*, 205 USPQ 215 (CCPA 1980). Thus, it would have been obvious to one of ordinary skills in the art at the time the invention was made to specify that at least 45% of the reflected UV radiation reaches the metal halide pool of the lamp of Parham, since discovering an optimum value of a result variable is considered within the skills of the art.

Regarding claim 4 it would have been obvious to one of ordinary skill in the art at the time of invention to optimize the reflectivity of the coating at a position where the UV emission from the arc tube is greatest which would provide maximum reflected UV radiation and hence enhance performance of the lamp. It is further noted that software programs are available in the market (as also disclosed by the applicant) for designing the reflecting coating with plural layers (as evidenced by USPN 5,138,219 to Krisl et al.)

Claim 5 is rejected under 35 U.S.C. 103(a) as being unpatentable over U.S. Patent 5,552,671 to Parham et al. and further in view of U.S. Patent 5,214,345 to Saito et al.

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Regarding claim 5 Parham is silent about determining the spectral distribution of the lamp when un-coated and then optimizing the coating to provide greater reflectivity of emitted UV radiation.

Saito in analogous art of ultraviolet shielding in a halogen arc lamp discloses (column 5 lines 34-63) using a non-coated lamp and finding relationship between the wavelength and relative intensity of emission of irradiated rays and using the data (Table 1) to find the region of emission of ultraviolet radiation. Saito further teaches thus coating on the lamp can be provided to shield UV radiation only and transmit the visible rays.

Therefore it would have been obvious to one of ordinary skill in the art at the time of invention to determine the spectral distribution for an uncoated lamp of Parham, finding the region of greatest UV emission and then providing the coating for optimizing the reflection of UV radiation from the lamp as taught by Saito.

Claim 11 is rejected under 35 U.S.C. 103(a) as being unpatentable over U.S. Patent 5,552,671 to Parham et al. and further in view of U.S. Patent 7,221,374 to Dixon.

Parham is silent about improving the efficiency of the lamp by determining spectral power distribution and then applying multilayer coating optimized to reflect UV light at each of the plurality of the wavelengths proportional to the spectral power.

Dixon in relevant art discloses (Fig. 4 column 4 lines 20-33, column 7 lines 17-37) aspects of a display light source (eg. Metal halide lamp) including efficiency can be modified by spectral power distribution of the light source. The optical modification of

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the lamp includes reflecting certain wavelengths and altering spectral distribution and can be configured by using (adding changing and/or removing) filters, attenuators.

Therefore it would have been obvious to one of ordinary skill in the art at the time the invention was made to employ changing the optical efficiency of the lamp by modifying spectral power distribution of the lamp using multilayer reflecting coating of Parham as suggested by Dixon. It is noted that Dixon does not explicitly disclose selecting optimum number and thickness of the layers of the coating (which is disclosed by Parham) for optimizing the coating to reflect UV light in direct proportion to spectral power at each wavelength but it would have been obvious to try the method of optimizing efficiency of Dixon since choosing from an identified predictable solution with a reasonable expectation of success is considered within skill of the art.

Claim 12 is rejected under 35 U.S.C. 103(a) as being unpatentable over U.S. Patent 5,552,671 to Parham et al., U.S. Patent 7,221,374 to Dixon and further in view of U.S. Patent 5,059,865 to Bergman.

Regarding claim 12 Parham and Dixon do not explicitly disclose the limitation of at least 45% of the UV emitted by the arc tube reflected by the coating reaches the metal halide pool.

Bergman in same field of endeavor discloses (column 4 lines 13-24) a metal halide lamp in which infrared reflective coating has the benefit of increasing the

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vaporization and ionization of the mercury inside the lamp and thus enhancing the efficacy of the lamp.

In the instant application UV radiation, is used for heating the metal halide pool in the lamp. Therefore it would be obvious to one of ordinary skill in the art at the time of invention to select the ultraviolet reflecting coating of Parham and Horikoshi such that most of the ultraviolet radiation emitted between 300-400 nm reaches the mercury pool for vaporizing and ionizing the mercury as suggested by Bergman (in case of infrared radiation) and thus enhancing the efficacy of the lamp.

It is noted that the more UV radiation reflected by the coating reaches the metal halide pool, more vaporization of the metal halide takes place and thus the lamp performance is enhanced. It has been held that discovering an optimum value of a result effective variable involves only routine skill in the art. *In re Boesch*, 205 USPQ 215 (CCPA 1980). Thus, it would have been obvious to one of ordinary skills in the art at the time the invention was made to specify that at least 45% of the reflected UV radiation reaches the metal halide pool of the lamp of Parham, since discovering an optimum value of a result variable is considered within the skills of the art.

Claims 8, 13,16-19 are rejected under 35 U.S.C. 103(a) as being unpatentable over U.S. Patent 5,552,671 to Parham et al. and further in view of U.S. Patent 6,611,082 to McGuire.

Regarding claim 8 Parham is silent about optimizing the multilayer coating at an angle selected to take into account the off-normal incidence of the radiation on the arc tube.

McGuire in pertinent art discloses (column 1 lines 35-43) a lamp with a coating with desired transmittance level of light that is directed at normal and off-normal incidence towards the coating. The portion of the light normally incident upon the lamp envelope has high probability of exiting the envelope and the portion that is incident off-normal has high probability of being reflected back to the filament.

Therefore it would have been obvious to one of ordinary skill in the art at the time of invention to take into account of off-normal incidence of the UV radiation on the arc tube of Parham and select the thickness and angle of deposition of the multilayer coating as suggested by McGuire for providing maximum reflection of the emitted UV radiation.

Regarding claim 13 Parham in view of McGuire disclose the step of improving the efficacy of a metal halide lamp comprising operating the lamp causing UV emission from an arc, and disposing a multi-layer coating on the surface of the arc tube the coating comprising layers of at least two materials of different refractive index which in combination transmits visible radiation and reflects UV radiation in the 300-400 nm range which causes further vaporization of liquid metal halide dose within the arc tube. The coating comprising silica in combination with tantala or titania contributes to the reflective quality and varying the combination of materials, preferred UV reflecting

configuration can be chosen. The multilayer coating is optimized at an angle taking account of off-angle incidence of the emitted UV radiation as suggested by McGuire.

Regarding claims 16 and 17 Parham and McGuire disclose the claimed invention except for the limitation of angle being less than 35 degree (claim 16) and between 10 and 35 degrees (claim 17). It has been held that where the general conditions of a claim are disclosed in the prior art, discovering the optimum or workable ranges involves only routine skill in the art. *In re Aller*, 105 USPQ 233. It would have been obvious to one having ordinary skill in the art at the time the invention was made to provide values of the off-normal incidence angle less than 35° and between 10° and 35°, since optimization of workable ranges is considered within the skill of the art.

Regarding claims 18 and 19 Parham and McGuire disclose the lamp having cylindrical shape but do not explicitly disclose it being vertically aligned.

The examiner notes that it is well known in the art that metal halide lamp operates both in horizontal and vertical alignments and hence it would be obvious to one of ordinary skill in the art at the time of invention to modify the coating of the lamp of Parham and McGuire for optimizing the off-normal incidence of UV radiation for vertically aligned metal halide lamp of cylindrical shape of Parham and McGuire so that angle lies between 15° and 30°.

Claim 22-25 are rejected under 35 U.S.C. 103(a) as being unpatentable over U.S. Patent 5,552,671 to Parham et al., U.S. Patent 6,611,082 to McGuire and further in view of U.S. Patent 5,138,219 to Krisl et al.

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Regarding claim 22 Parham and McGuire do not teach using computer program for calculating thickness of each layers and optimum number of layers of the multilayer coating for optimizing the coating at an angle.

Krisl in pertinent art discloses (column 7 lines 64 through column 8 line 15) using computer optimized programs resulting in optimum thickness and the number of layers in a multilayer optical interference coating for transmitting visible spectrum of at least about 90% between 400-700 nm and a reflectance of 70% of infra red spectrum. It is noted that computer programs provide simple optimization method for handling a large number of data relating thickness, refractive indices of various materials in a multi-stack arrangement of different layers.

Therefore it would have been obvious to one of ordinary skill in the art at the time the invention was made to utilize computer program to optimize the coating of the lamp of Parham and McGuire as taught by Krisl for providing simple optimization method for handling a large number of data relating thickness, refractive indices of various materials in a multi-stack arrangement of different layers.

Regarding claim 23 Parham discloses (column 4 line 63 through column 5 line 15) preferred combination of silica and tantala or titania contributes to the reflective quality of the coating, tantala and titania contribute to mainly UV absorption and silica to UV reflection. Therefore it would have been obvious to one of ordinary skill in the art to apply greater weighting of silica component in the optimized multilayer coating for providing high reflectivity in the regions where spectral power is high.

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Regarding claim 24 Parham discloses (claims 19, 28 Fig. 5B) coating is provided such that 90% of UV emission between 300 and 400 nm is reflected.

Regarding claim 25 Parham and McGuire disclose the claimed invention except for the limitation of optimizing the coating for 95% reflection of UV between 300 and 370 nm. It has been held that discovering an optimum value of a result effective variable involves only routine skill in the art. *In re Boesch*, 205 USPQ 215 (CCPA 1980). Thus, it would have been obvious to one of ordinary skills in the art at the time the invention was made to optimize the coating of Parham and McGuire for 95% reflection of UV between 300 and 370nm, since discovering an optimum value of a result variable is considered within the skills of the art.

Allowable Subject Matter

Claims 9,10,14,15 and 20,21 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Regarding claims 9, 14 and 20 the prior art of record does not teach or suggest the method of improving the efficacy of the lamp by determining the mean angle at which UV light strikes the arc tube and with a computer program optimizing the coating for a selected angle to the arc tube wall, selecting the angle to be within 10° of the mean angle.

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Claims 10, 15 and 21 would be allowable for the same reason because of their dependency status from claims 9,15 and 20 respectively.

Response to Arguments

Applicant's arguments filed May 8, 2007 regarding claim 1 have been fully considered but they are not persuasive.

In response to applicant's argument that Parham does not disclose the coating reflecting at least 95% of UV the Examiner respectfully disagrees. Parham discloses that the multi-layer coating contributes to the reflective quality and varying the combination of materials, preferred UV reflecting configuration can be chosen. In Fig. 5B Parham discloses the coating being optimized to reflect at least 95% (98% for claim 2) of the UV radiation striking the coating.

Applicant's arguments with respect to claims 11,13 have been considered but are moot in view of the new ground(s) of rejection.

Contact Information

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Sikha Roy whose telephone number is (571) 272-2463. The examiner can normally be reached on Monday-Friday 8:00 a.m. – 4:30 p.m.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Nimeshkumar D. Patel can be reached on (571) 272-2457. The fax phone number for the organization is (571) 273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR.

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Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

Sikha Roy

Sikha Roy
Primary Examiner
Art Unit 2879